

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.

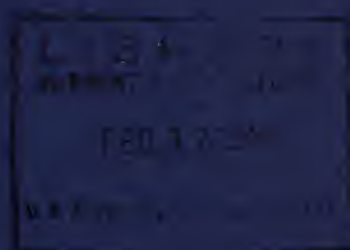


1.96  
31.Fsm

# FEDERAL STATE COOPERATIVE SNOW SURVEYS and IRRIGATION WATER FORECASTS

for  
**MISSOURI-ARKANSAS DRAINAGE BASIN**

February 1, 1949



67

Division of Irrigation, Soil Conservation Service  
United States Department of Agriculture  
and  
Colorado Agricultural Experiment Station

Data reported in this report were obtained by the cooperating parties, through in cooperation with the U.S. Forest Service, Bureau of Reclamation, State Engineers of Colorado, Wyoming and New Mexico and other Federal State and local organizations.



## WATER SUPPLY OUTLOOK

### MISSOURI-ARKANSAS DRAINAGE BASINS

February 1, 1949

Snow accumulation to February 1 was above normal throughout the mountain areas of the Missouri and Arkansas Rivers and their tributaries. The snow cover is relatively heavier in southern Wyoming and northern Colorado with somewhat less on the Bighorn, Upper Missouri and in northern Montana. Snow covers the valleys but in some districts drifting has been excessive. Reservoir storage in most areas is slightly under a year ago. Soil moisture is expected to be fairly good by spring even though many areas were dry before recent snows.

### MISSOURI RIVER AND TRIBUTARIES IN MONTANA

From a limited number of snow surveys on the Upper Missouri and Yellowstone Rivers, the snow-water contents are about 40 percent above normal. Snow cover on the headwaters of the Madison and Gallatin Rivers is 50 to 60 percent above February 1, 1948. On the Jefferson River the snow cover is similar to a year ago but on the Missouri River tributaries between Helena and Great Falls it is 80 percent of last year. Snow conditions on the Marias River are much improved over a year ago. Storage in most Montana reservoirs at this time is very close to a year ago. In Fort Peck Reservoir the amount of water stored is now 12,700,000 acre-feet as compared to 13,130,000 on February 1, 1948. Precipitation during January has been near average. At the present time ice-flows in the Missouri and Yellowstone Rivers are presenting a definite flood hazard in case of a sudden thaw.

### BIGHORN RIVER BASIN

As shown by February 1 snow surveys the snow accumulation is not as heavy as on adjacent watersheds. An exception to this trend is the headwaters of the Popo Agie where the snow-water content is 162 percent of normal. The snow cover is relatively higher at 9500 to 10,000 feet with near average conditions at lower elevations. Range and irrigated areas are snow-covered throughout the valley above and below the Wind River Canyon. Storage in Buffalo Bill Reservoir is now 230,000 as compared to 344,000 on February 1, 1948. In Bull Lake and Pilot Butte Reservoirs there is now stored 63,000 acre-feet; a year ago it was 111,000. Soil moisture conditions are reported as good throughout the Basin.

### CHEYENNE RIVER

Snow cover in the Black Hills is about twice normal and is considered adequate to fill Belle Fourche Reservoir, which now has 116,000 acre-feet in storage.



### NORTH PLATTE RIVER

On the headwaters of the Laramie, North Platte and Sweetwater Rivers the snow accumulation to February 1 was very high. The snow-water contents are now close to the April 1 average for the past record and 50 to 80 percent above normal. Summer runoff in these streams should be at least average and if the present rate of snow accumulation continues the runoff will be excessive. Snow in the North Park area is estimated as the heaviest for the past 20 years. Storage in the four major reservoirs on the North Platte is now 1,119,000 acre-feet as compared to 1,339,000 a year ago. The normal carryover for these reservoirs for the past ten years is about 400,000 acre-feet. In the Wheatland Reservoir system, there is now 30,000 acre-feet in storage, about one-half of that stored on February 1, 1948. In Kingsley and Sutherlund Reservoirs in Nebraska, the storage now totals 1,587,000 acre-feet, practically the same as last year. Soil moisture throughout the valley area from southern Wyoming to eastern Nebraska is reported as good. Streamflow is below normal due to extremely low temperatures in January.

### SOUTH PLATTE RIVER

The water supply outlook for the South Platte and its tributaries is very favorable at this time. However, about one-half of the snow cover accumulates after February 1 on the average and any estimate of runoff should be considered as preliminary and subject to the amount of snow to come at a later date. With the exception of Boulder Creek the snow-water contents were much above normal. Boulder Creek snow courses show 9 percent above normal and 80 percent of last year. Other South Platte tributaries range from 149 percent of normal on Clear Creek to 229 percent of normal on the St. Vrain River. Reservoir storage for irrigation is generally slightly under last year and about 1/4 less in the Fort Morgan and Sterling districts. Recent precipitation has ranged from well over normal above Denver to normal throughout the rest of the valley. The soil is dry and in many areas the snow has drifted to such an extent as to be of little value to soil moisture. Streamflow is about average.

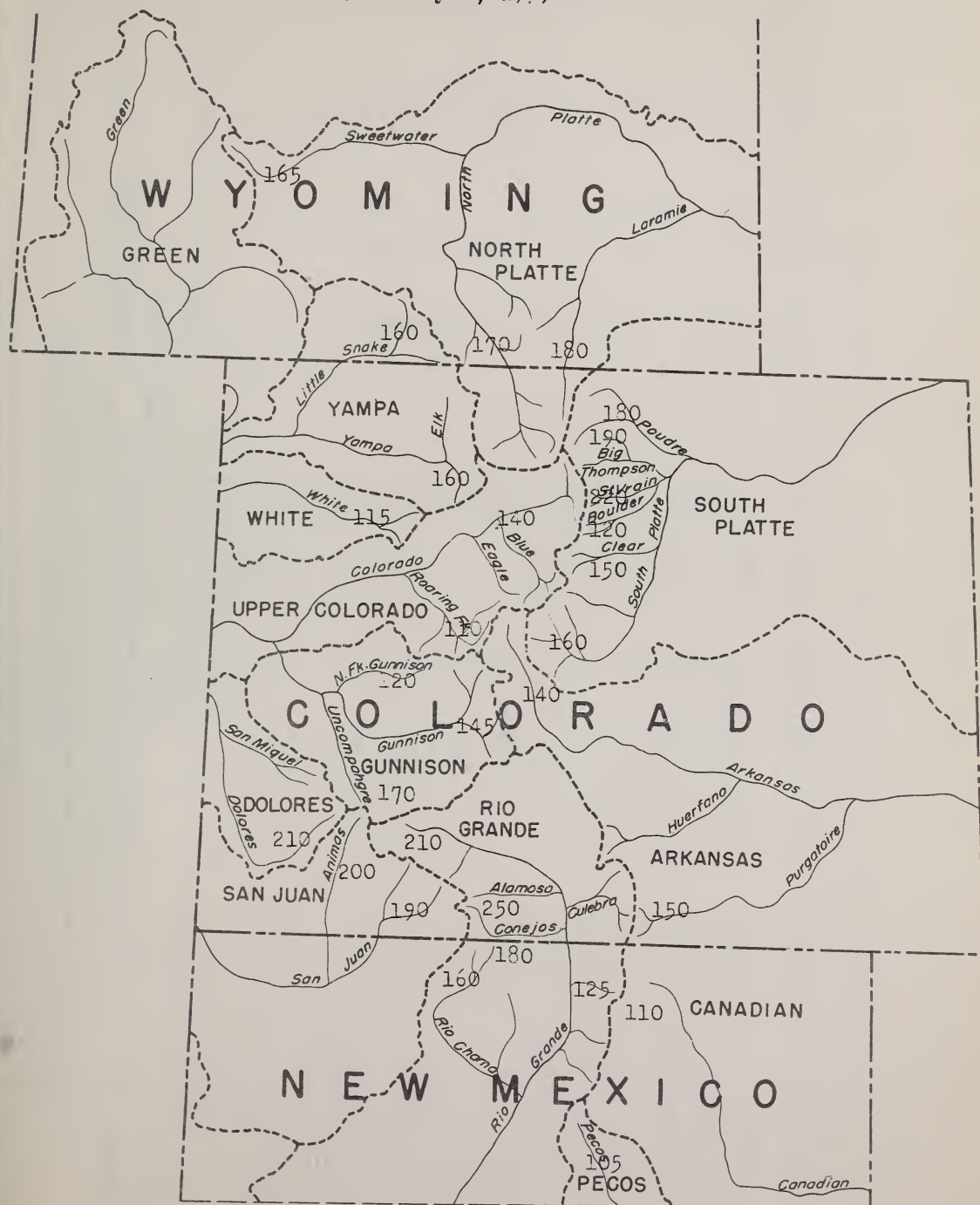
### ARKANSAS RIVER

On the headwaters of the Arkansas River snow cover is less than in other areas in Colorado. However, February 1 snow surveys show an average of 37 percent above normal and 20 percent over last year. Precipitation in the valley has been generally below average during recent months. Soil moisture is dry except at higher elevations. Reservoir storage is about one-half of a year ago, except for John Martin and Great Plains. Current storage in these reservoirs is 126,000 and 100,000, respectively.



WATER CONTENT OF SNOW ON THE WATERSHEDS OF  
PLATTE, ARKANSAS, UPPER COLORADO AND RIO GRANDE BASINS  
BASED ON SNOW SURVEYS MADE APPROXIMATELY FIRST DAY OF MONTH

In Percent of Normal  
February 1, 1949





## SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA

## WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

## MISSOURI-ARKANSAS DRAINAGE BASINS

WATERSHEDS	Snow Depth		Water Content		Number Courses in Average	Snow Density		1949 Water Content in percent of Thirteen year Avg.*	
	Thirteen Year Avg.*	In.	In.	In.		Thirteen year Avg.*	1948 Percent	1949 Percent	1948 year Avg.*
MISSOURI RIVLR	In.	In.	In.	In.		Percent	Percent	Percent	
Jefferson River	15.4	20.3	25.0	2.7	1	18	18	16	144
Madison River	34.1	31.3	42.6	8.1	3	24	25	28	145
Gallatin River	38.6	34.4	48.3	9.7	1	25	25	29	146
Yellowstone River			35.6		3			24	
Missouri River**	23.4	37.5	35.4	5.6	4	24	25	21	134
Marias River	35.5	30.4	45.3	11.2	1	32	27	28	112
Cheyenne River	18.2	23.0	31.0	3.1	3	17	19	21	210
Shoshone River	42.2	--	46.8	11.7	2	28		32	126
Wind River	28.6	--	32.7	6.5	6	23		25	126
Popo Agie	26.4		38.4	5.8	3	22		24	162
Sweetwater	33.0		46.6	7.5	2	23		25	155
North Platte River	44.0	43.4	59.9	11.2	8	25	28	31	167
Laramie River	24.8	30.5	38.0	6.0	5	24	24	29	182
South Platte River***	20.1	28.0	27.4	3.5	3	17	17	21	163
Crow Creek	13.8	21.6	25.9	2.7	1	20	21	27	256
Poudre River	21.2	31.3	32.8	5.6	3	26	24	30	179
Big Thompson River	27.3	33.5	40.6	5.8	1	21	22	27	190
St. Vrain River	28.0	--	43.2	6.3	1	22		33	229
Boulder Creek	35.8	45.0	45.7	10.3	1	29	31	25	109
Clear Creek	34.6	41.5	40.9	7.9	2	23	21	29	149
ARKANSAS RIVER	27.2	32.1	32.8	5.7	9	21	20	24	137

\*Some for shorter periods

\*\*Between Helena and Great Falls

\*\*\*Above Denver, Colo.

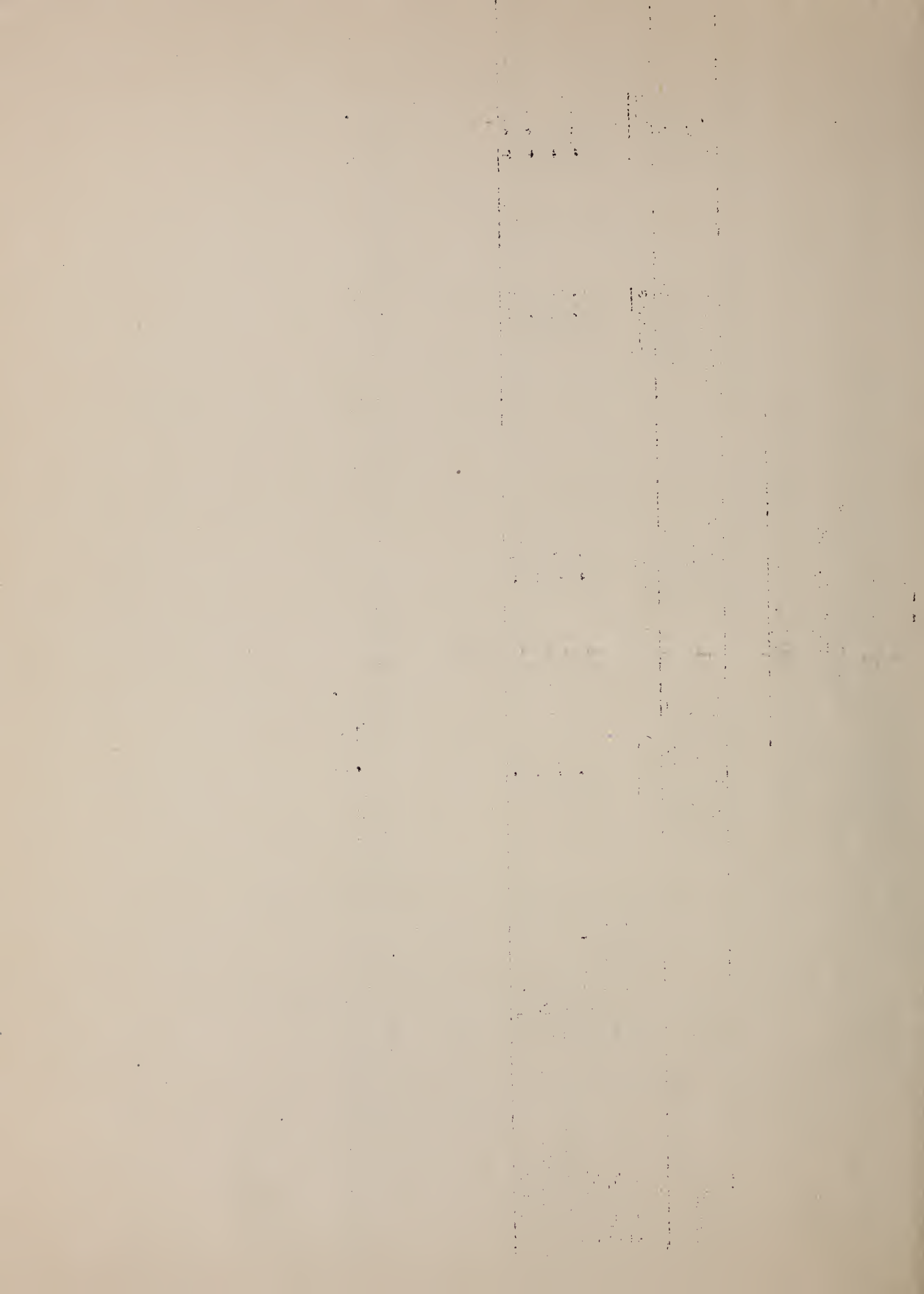
1. 1948年3月1日  
2. 1948年3月2日  
3. 1948年3月3日  
4. 1948年3月4日  
5. 1948年3月5日  
6. 1948年3月6日  
7. 1948年3月7日  
8. 1948年3月8日  
9. 1948年3月9日  
10. 1948年3月10日  
11. 1948年3月11日  
12. 1948年3月12日  
13. 1948年3月13日  
14. 1948年3月14日  
15. 1948年3月15日  
16. 1948年3月16日  
17. 1948年3月17日  
18. 1948年3月18日  
19. 1948年3月19日  
20. 1948年3月20日  
21. 1948年3月21日  
22. 1948年3月22日  
23. 1948年3月23日  
24. 1948年3月24日  
25. 1948年3月25日  
26. 1948年3月26日  
27. 1948年3月27日  
28. 1948年3月28日  
29. 1948年3月29日  
30. 1948年3月30日  
31. 1948年3月31日

SNOW SURVEYS AND IRRIGATION WATER FORECASTS  
FOR MISSOURI AND ARKANSAS RIVERS  
February 1, 1949

P R E C I P I T A T I O N   D A T A

WATERSHED	STATE	Precipitation October 1 to January 31	Departure from Normal	Precipitation	Departure from Normal
		Inches	Inches	January Inches	Inches
Missouri	East. Mont.			1.07	+0.29
Missouri	Cent. Mont.		+0.56	1.47	+0.52
Missouri	North Wyo.	3.83	+1.50	0.88	+0.50
North Platte	Wyoming	5.19	-0.04	1.32	+0.44
South Platte	Colorado	2.88	-0.37		
Arkansas	Colorado	3.64			

Accumulated precipitation since October 1 on the watershed of the Missouri River in Colorado and Wyoming was above normal except for the South Platte. Precipitation on the Arkansas River was also below normal. January precipitation was above normal in all areas.



MISSOURI-ARKANSAS RIVERS SNOW SURVEYS,  
February 1, 1929

Drainage Basin and Snow Course	Location			Snow Course Measurements			Past Record
	No. and State	Sec.	Range or Long.	Elev.	Date of Survey	Water Content (Inches)	
			Lat.			1949	Years of Record
						In.	
						1948	
						In.	
						1947	
						In.	
							Av. Water Content (Inches)
MISSOURI RIVER							
JEFFERSON RIVER							
Camp Creek*	6 Ida.	21	36E	6800			11
Picnic Grounds	Mont	22	6W	6500	1/21	9.3	4
Gibbons Pass	10 "	4	19W	7100		3.1	9
Pipestone Pass	30 "	11	7W	7200	1/31	23.5	9
			Average for drainage			5.0	
						<u>3.1</u>	<u>2.7</u>
MADISON RIVER							
Aster Creek*	2 Wyo.			7700	1/14		11
Lewis L. Divide*	8 "		110.6W	7900	1/14	23.4	11
Big Springs*	3 Ida	34	44E	6500	1/28	32.9	11
W. Yellowstone	16 Mont	34	5E	6700	1/31	15.0	11
21-Mile*	"	1	5E	7150	2/1	9.4	11
Hebgen Dam	"	22	5E	6550	1/31	14.6	11
Valley View	Ida.	7	4E	6500	1/29	9.2	11
			Average for drainage			11.2	3
						<u>11.1</u>	<u>8.1</u>
GALLATIN RIVER							
Mystic Lake #1	Mont.	31	7E	6600		5.4	11
Mystic Lake #2	"	31	7E	6600	2/1	4.0	11
21-Mile	"	1	5E	7120	2/1	14.6	11
			Average for drainage			<u>14.6</u>	<u>9.7</u>
YELLOWSTONE RIVER							
Lake Camp	1 Mont.		110.4W	7850	2/1	8.4	
Canyon	2 "		110.5W	7750	2/1	10.2	
Cooke City	10 "	25	14E	7400	2/1	6.7	
			Average for drainage			<u>14.2</u>	
MISSOURI RIVER**							
Chessmen Res.	6 Mont.	2	5W	6200	2/2	5.0	11
Lower Rimini	41 "	13	6W	6250	1/31	7.3	11
Middle Rimini	42 "	13	6W	6800	2/2	10.9	11
Upper Rimini	43 "	19	5W	8000	2/1	13.5	11
			Average for drainage			<u>9.2</u>	
MARIAS RIVER	20 Mont			5250	2/1	8.2	11
Marias Pass			48.3N	113.4W		20.2	

\*on adjacent drainage

\*\*Between Helena and Great Falls

1000  
1000  
1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

1000  
1000

## MISSOURI ARKANSAS RIVERS SNOW SURVEYS

February 1, 1949

Drainage Basin and Snow Course	Location			Snow Cover Measurements									
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Yrs. of Rec.	Av. Water Content (Inches)	
								1949	1948	1947			
MISSOURI RIVER													
SHOSHONE RIVER													
Sylvan Pass	32 Wyo.	12	52N	110W	7100	1/30	39.4	11.0	9.4	5	10.3		
Brooks Lake #3*	50 "	23	44N	110W	9200	1/26	54.1	18.7	18.7	8	13.1		
East Entrance	65 "	17	52N	109W	7000	1/31	36.7	10.7	--	--	--		
			Average for drainage				46.8	14.8	14.0		11.7		
UPPER WIND RIVER													
Sheridan Creek R.S.	49 "	3	42N	109W	7500	1/26	27.2	6.3	5.4	7	4.6		
Brooks Lake #3	50 "	23	44N	110W	9200	1/26	54.1	18.7	18.7	8	13.1		
St. Lawrence R.S.	51 "	26	1N	4W	9000	2/4	29.3	5.7	5.7	5	5.2		
Mosquito Park RS	52 "	23	2S	3W	9500	2/3	30.8	6.8	4.0	5	5.6		
DuNoir	53 "	27	42N	108W	8750	1/27	29.0	6.2	7.3	7	6.0		
T-Cross Ranch	54 "	1	43N	107W	8000	1/30	26.0	5.5	5.0	7	4.6		
Hobbs Park	55 "	22	2S	3W	10000	2/3	45.6	12.8					
Trout Creek	56 "				8400	2/3	25.3	5.8					
Dinwoodie	60 "	9	38N	105W	10000	1/28	36.8	9.1					
Dry Creek	61 "	34	4N	105W	9500	1/28	25.9	5.1					
Burrroughs Creek	62 "	15	43N	107W	8800	2/2	39.1	9.8					
Little Horn	63 "	24	41N	108W	9500								
Geyser Creek	64 "	12	41N	108W	8500	1/27	28.8	6.3	7.7			6.5	
			Average for drainage				32.7	8.2					
POPO AGIE RIVER													
Sawmill Glade	45 "	3	31N	101W	8500	2/1	27.0	5.9	3.5	7	3.9		
Blue Ridge	46 "	23	31N	101W	9500	2/1	41.4	10.0	8.2	7	6.2		
South Pass	47 "	13	30N	101W	9000	1/31	46.7	12.2	9.8	7	7.4		
			Average for drainage				38.4	9.4	7.2		5.8		
LOWER BIG HORN													
Owl Creek	58 "	36	43N	101W	8700	1/24	18.4	4.2					
Beavers Mill	59 "	6	43N	102W	8900	1/25	24.5	5.5					
Timber Creek	66 "	25	47N	103W	9000	1/29	21.0	5.0					
			Average for drainage				21.3	4.9					

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

MISSOURI-ARKANSAS RIVERS SNOW SURVEYS  
February 1, 1949

Drainage Basin and Snow Course	No. and State	Location		Date of survey	Snow Depth (Inches)	Snow Cover Measurements				Past Record Yrs. of Rec.	Water Content (Inches)	
		Sec.	Tp.			Range	Elec.	1949	1948			1947
MISSOURI RIVER												
CHEYENNE RIVER Upper Spearfish Upper Castle Deerfield	1 S. Dak.	21	3N	1E	6500	2/1	38.8	8.7	5.7	2.7	5	3.9
	2 "	24	2N	1E	6800	2/1	31.5	6.4	4.7	3.1	4	3.3
	3 "	23	1N	2E	6000	1/28	22.6	4.5	2.6	2.4	5	3.3
			Average for Drainage				31.0	6.5	4.3	2.7		3.1
SWEETWATER RIVER												
Grannier Meadows South Pass*	29 Wyo.	19	3ON	100W	9000	1/31	46.5	11.1	--	10.3	7	7.6
	47 "	13	3ON	101W	9000	1/31	46.7	12.2	--	9.8	7	7.4
			Average for drainage				46.6	11.6	--	10.0		7.5
NO. PLATTE RIVER												
Cameron Pass Park View Columbine Lodge Willow Cr. Pass* Spicer Bottle Creek Webber Spring Old Battle N. French Creek N. Barrett Creek Ryan Park Spring Creek Albany La Bonte	1 Colo	2	6N	76W	10300	1/27	50.7	16.5	13.5	14.2	10	11.3
	7 "	24	5N	78W	9200	1/27	37.4	8.6	--	6.8	11	5.1
	8 "	21	5N	82W	9300	2/1	61.0	19.6	15.8	10.9	13	12.9
	62 "	1	4N	78W	9500	1/27	44.7	12.4	--	8.0	9	6.8
	112 "	27	6N	81W	8400	2/3	40.8	12.7	--	--		
	7 Wyo.	24	14N	85W	8200	1/27	47.1	13.8	8.7	7.3	11	6.9
8 "	27	14N	85W	9000	1/27	60.4	18.7	10.2	10.8	11	9.0	
9 "	29	14N	85W	9800	1/26	91.3	28.1	17.7	17.7	21.2	11	17.0
37 "	27	16N	80W	10200	1/31	71.0	24.1	15.5	15.5	13.4	11	15.4
38 "	30	16N	80W	9400	1/31	57.0	16.7	10.2	10.2	9.8	11	10.6
39 "	34	16N	81W	8400	2/1	41.1	11.5	5.9	5.9	5.1	11	6.1
67 "	32	15N	85W	9000								
68 "	18	14N	78W	9400	2/3	42.6	12.1	12.1	12.1			
69 "	11	27N	74W	8450		59.9	18.6	18.6	12.2	11.6		11.2
		Average for drainage										

1. The first part of the report is a general introduction to the subject of the study. It discusses the importance of the problem and the objectives of the research.

2. The second part of the report is a detailed description of the methods used in the study. It includes a discussion of the experimental design, the data collection procedures, and the statistical analysis techniques.

3. The third part of the report is a presentation of the results of the study. It includes a discussion of the findings, a comparison of the results with previous research, and a discussion of the implications of the findings.

4. The fourth part of the report is a conclusion and a discussion of the limitations of the study. It includes a summary of the main findings, a discussion of the strengths and weaknesses of the study, and a discussion of the need for further research.

5. The fifth part of the report is a list of references. It includes a list of the books, articles, and other sources that were consulted during the study.

6. The sixth part of the report is an appendix. It includes a list of the tables and figures that are included in the report, and a list of the abbreviations and symbols that are used in the report.

7. The seventh part of the report is a list of the names of the people who were involved in the study. It includes the names of the principal investigator, the co-investigators, and the research assistants.

8. The eighth part of the report is a list of the names of the people who were consulted during the study. It includes the names of the members of the advisory committee, the members of the review board, and the members of the public.

9. The ninth part of the report is a list of the names of the people who were interviewed during the study. It includes the names of the participants, the members of the advisory committee, and the members of the review board.

10. The tenth part of the report is a list of the names of the people who were interviewed during the study. It includes the names of the participants, the members of the advisory committee, and the members of the review board.

11. The eleventh part of the report is a list of the names of the people who were interviewed during the study. It includes the names of the participants, the members of the advisory committee, and the members of the review board.

12. The twelfth part of the report is a list of the names of the people who were interviewed during the study. It includes the names of the participants, the members of the advisory committee, and the members of the review board.

13. The thirteenth part of the report is a list of the names of the people who were interviewed during the study. It includes the names of the participants, the members of the advisory committee, and the members of the review board.

## MISSOURI-ARKANSAS RIVERS SNOW SURVEYS

February 1, 1949

Drainage Basin and Snow Course	Location				Snow Cover Measurement						Past Record	
	No. and State	Sec	Twp	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Yrs.of Rec.	Av.Water Content(Inches)
								1949	1948	1947		
LARAMIE RIVER						MISSOURI RIVER						
W.Port.G-P Tun.	4 Colo	7	8N	75W	8600			--	--	5.1	8	4.9
Deadman Hill*	50 "	26	10N	75W	10200			--	--	9.7	9	7.3
Roach	88 "	5	10N	77W	9800			15.4	--	13.5	8	9.4
McIntyre	111 "	35	10N	76W	9100			10.5				
Brooklyn Lake	3 Wyo.	11	16N	79W	10200			17.8				
Fox Park	11 "	21	13N	78W	9200			8.7	11.9	12.2	11	11.8
Pole Mtn. #2*	34 "	35	15N	72W	8700			6.9	6.6	3.9	12	5.0
Libby Lodge	35 "	29	16N	78W	8700			9.9	4.6	2.6	12	2.7
Hairpin Turn	36 "	24	16N	79W	9500			11.0	6.3	5.2	11	4.9
Albany	68 "	18	14N	78W	9400			12.1	7.2	6.2	11	5.8
					Average for drainage			10.9	7.3	--	--	--
										6.0		6.0
CROW CREEK												
Pole Mtn. #2*	34 "	35	15N	72 W	8700			6.9	4.6	2.6	12	2.7
POUDRE RIVER												
Cameron Pass	1 Colo	2	6N	76W	10300			16.5	13.5	14.2	10	11.3
Chambers Lake	2 "	6	7N	75W	9000			9.1	6.4	4.0	10	4.2
Big South	3 "	33	8N	75N	8600			4.5	2.9	1.2	10	1.3
Deadman Hill	50 "	26	10N	75W	10200			--	--	9.7	9	7.3
Lake Irene*	65 "	8	5N	75W	10600			19.3	--	13.6	10	11.9
Hour Glass Lake	68 "	18	7N	73W	9500			--	--	4.6	9	3.9
Red Feather	128 "	26	10N	74W	9000			9.0	--			
					Average for drainage			10.0	7.6	6.5		5.6
BIT THOMPSON RIVER												
Lake Irene*	65 "	8	5N	75W	10600			19.3		13.6	10	11.9
Hidden Valley	95 "	23	5N	75N	9550			11.0	7.3	7.8	9	5.8
Deer Ridge	115 "	19	5N	73W	9050			7.5	--	--		--
					Average for drainage			11.0	7.3	7.8		5.8
ST. VRAIN RIVER												
Wild Basin	41 Colo.	24	3N	74W	10000			14.4	--	8.4	11	6.3
Copeland Lake	116 "	21	3N	73W	8600			6.5	--			
Raymonds	129 "	5	2N	72W	8750			2.8	--			
					Average for drainage			14.4	--	8.4		6.3

\*On adjacent drainage

[illegible]

1. The first group of people who are interested in the results of the study are the researchers themselves. They want to know if the study was successful in achieving its objectives and if the results are consistent with their expectations. They also want to know if the study was conducted in a rigorous and unbiased manner.

-9-  
MISSOURI-ARKANSAS RIVERS SNOW SURVEYS  
February 1, 1949

Drainage Basin and Snow Course		No. and State	Location			Date of Survey	Snow Depth (Inches)	Snow Cover Measurements			
			Sec.	Twp.	Range			Elev.	Water Content (Inches)	Years of Record	Past Record Ave. Water Content(Inches)
MISSOURI RIVER											
BOULDER CREEK											
E. Port Moffat T.	5 Colo	2	2S	74W	9400	2/1	10.9	3.1	2.8	10	2.2
University Camp	60 "	28	1N	73W	10300	2/5	45.7	11.2	10.7	10	10.3
			Average for Drainage				45.7	11.2	10.7		10.3
CLEAR CREEK											
Loveland Pass	61 "	27	4S	76W	10100	1/28	37.7	10.7	7.6	9	6.5
Grizzly Peak*	97 "	2	5S	76W	11250	1/28	44.1	13.0	9.9	7	9.3
Empire	117 "	21	3S	75W	9650	2/1	16.7	3.5			
			Average for Drainage				40.9	11.8	8.8		7.9
SOUTH PLATTE RIVER											
Hoosier Pass	14 Colo	13	8S	78W	11400	1/31	35.3	8.3	5.4	10	5.7
Fairplay	15 "	33	9S	77W	10000	2/1	15.1	2.0	1.6	10	0.8
Jefferson Cr.	83 "	14	7S	76W	10100	1/31	31.7	6.8	4.7	9	4.0
Geneva Park	118 "	18	6S	74W	9750	1/31	18.5	4.9			
Antero	120 "	1	13S	77W	9200	2/1	14.7	2.7			
Deer Creek	130 "	28	6S	78W	8950	1/31	12.7	2.4			
			Average for Drainage				27.4	5.7	3.9		5.5
ARKANSAS RIVER											
Tennessee Pass	19 Colo	21	8S	80W	10200	1/30	32.6	6.8	3.2	13	4.6
Twin Lakes T.	21 "	22	11S	82W	10500	2/1	28.8	6.8	7.4	11	6.0
Marshall Creek*	42 "	24	48N	6E	10800	1/30	39.1	10.1	5.2	13	6.6
Poncha Creek	43 "	19	48N	7E	10500	1/30	33.2	9.1	4.3	13	6.2
Whiskey Creek	72 "	37.2N	37.2N	105.2W	10300	1/31	21.7	5.7	3.3	9	3.6
La Veta Pass*	74 "	22	28S	70W	9300	2/1	30.8	6.8	7.0	9	4.9
4-Mile Park	78 "	23	11S	81W	9700	1/31	17.4	2.5	2.5	9	2.4
Fremont Pass	79 "	2	8S	79W	11400	1/27	43.3	10.5	9.0	13	8.2
Monarch Pass	92 "	16	49N	6E	10500	1/28	48.6	11.8	4.9	8	9.1
St. Elmo	119 "	31	15S	80W	10600	2/1	36.2	8.0			
Timberline	121 "	8	9S	81W	11100	2/3	53.6	14.5			
			Average for Drainage				52.8	7.8	5.4		5.7

\*On adjacent drainage

Handwritten text in the right margin, possibly a list or index, including the word "Index" at the top.

Handwritten text at the top of the page, possibly a title or header.

Handwritten text in the upper middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text in the middle section of the page.

Handwritten text at the bottom of the page.

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

#### State

Colorado State Engineer  
Wyoming State Engineer  
Utah State Engineer  
New Mexico State Engineer  
Arkansas State Engineer  
Iowa State Engineer  
Colorado Experiment Station  
Colorado Extension Service  
Montana Experiment Station  
Utah Experiment Station

#### FEDERAL

Department of Agriculture  
Forest Service  
Soil Conservation Service  
Department of Interior  
Bureau of Reclamation  
Geological Survey  
National Park Service  
Department of Commerce  
Weather Bureau  
War Department  
Army Engineer Corps

#### MUNICIPAL UTILITIES

Colorado Public Service Company  
Western Colorado Power Company  
Arkansas Power Company  
Public Service Company of New Mexico  
Denver and Rio Grande Western R. R. Company

#### MUNICIPALITIES

City of Golden  
City of Denver  
City of Boulder

#### WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association  
Arkansas Valley Litch Association  
Colorado River Water Conservation District

#### IRRIGATION PROJECTS

Turner Reservoir and Irrigation Company  
San Luis Valley Irrigation District  
Santa Maria Reservoir Company  
Castilla Land Company  
Uncompagere Valley Water Users' Association  
Tyndall Development Company  
Goshute Irrigation District  
Sawatch Project  
Poudre Irrigation District  
Salt River Valley Water Users' Association  
San Carlos Irrigation and Drainage District  
Rio Lugo Reservoir and Canal Company

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

